

EUROPEAN PATENT APPLICATION

Application number: **84830357.4**

Int. Cl.⁴: **B 63 B 15/02, B 63 B 35/82**

Date of filing: **27.12.84**

Priority: **20.01.84 IT 4757284**

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Date of publication of application: **07.08.85**
Bulletin 85/32

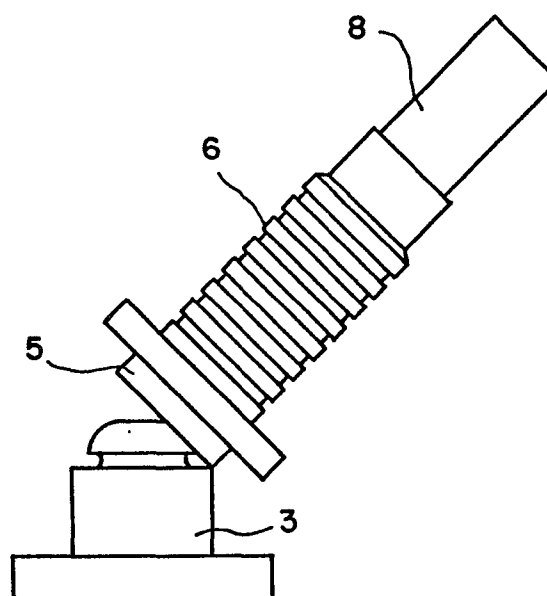
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Designated Contracting States: **AT BE CH DE FR GB LI NL SE**

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A device for the erection of the mast of a sailing board.

A device for the erection of the mast of a sailing board for «windsurf» includes an articulated joint comprising separate members kept coupled together by means of a system comprising a flexible rope and a spring, such that a displacement of the mast from the vertical attitude causes the loading of the spring thus creating a force tending to bring back in vertical attitude the mast. The device may be assembled on a track that allows to change the position of the foot of the mast through the operation of a pedal.



The present invention relates to a device for the erection of the mast of a sailing board.

5 With the expression "sailing board" we mean the implements for "windsurf" on water, provided with sail, as well as the implements with wheels or skates for the practice of this kind of sport on ground referred to as "windskeboards".

10 Outline of prior art

It is known that the mast of a sailing board is erected on a mast foot that is inserted into holes present in the sailing board itself. These holes are in general in the number of two and allow to place the mast in
15 two positions on the sailing board.

It is also known that the foot of the mast is provided with a joint constituted of a flexible member, generally made of an elastomeric material shaped as a double cone, that may bend allowing to the mast to assume any
20 inclined attitude with respect to the vertical, being included the position in which the mast is completely horizontal. With this kind of articulated joint the position of the mast is determined by the balance between the force of the wind tending to bring down the
25 mast and the force of the arms and the weight of the windsurfer. In particular when the mast has fallen down, it must be re-erected by means of a rope solely with an effort of the arms. The effort that the windsurfer has to make is quite appreciable and a continuous one and, even if this is quite common in any
30 sport activity, many persons not sufficiently gifted with muscles, are compelled to give up the practice of this fascinating sport activity.

It is also known that some sailing boards are provided, in substitution of the holes for the erection of the mast, with a system that allows to arrange the foot of the mast in any position between two extreme positions, so that the position of the mast can be selected continuously at will, in order to have the center of force of the sail in the position most sought with respect to the board. These systems are however cumbersome in operation because it is necessary to use hands for operating them and this is an inconvenience for a windsurfer who is in open seas and in a precarious balance on the board.

Summary of the invention

It is the object of this invention a mast foot device that shows an articulated joint of a new kind that, while it allows the bending of the mast with respect to the vertical attitude, it creates a force tending to restore the vertical attitude of the mast, providing in this way a help to the windsurfer who, with the device according to the present invention, will have to use only a fraction of the force of the arms that was necessary with the conventional mast foot.

The device according to the present invention for the erection of the mast, includes a base fastened to the board that carries a first articulated joint member of the ball-joint type, a mast foot support that carries a second articulated joint member of the ball-joint type engaged with said first member of the base, for constituting an articulated joint of the ball-and-socket type, an elastic tie-member unit including a flexible member resistant to tensile stress restrained to said base and a return spring restrained between said support and said flexible member, said base and said

support being kept together by said flexible member and being normally axially in register, so that a bending of said flexible member caused by a rotation in a vertical plane of the support with respect to the base, causes a strain upon said spring that produces a force tending^{to}/restore said support in alignment with said base, and a mast foot coaxial and freely rotatable around said support.

It is also object of the present invention a seat for the abovementioned device for the erection of the mast, that may be applied to sailing boards provided with holes for the assembly of the conventional mast foot, such seat allowing to position the mast in any place between two extreme positions, by means of a simple operation performed with the foot.

Said seat according to the present invention comprises two pins for its fastening to the two holes of the board, said seat having a guideway and a series of positioning holes, a slider that may be slidably engaged with said guideway, said first articulation member of the ball-and-socket joint type being integral with said slider locking pins that can be engaged with said holes in the seat, a pedal lever hinged to said slider that controls the engagement and the release of said locking pins with the holes of said seat, elastically maintained in the engagement position, so that said slider may be positioned at will within said seat for defining the position of the mast of the sailing board.

In the drawings:

figure 1 is a view of the device according to the invention;

figure 2 shows the device of figure 1 with the articu-

lated part inclined with respect to the vertical;
figure 3 is a sectional exploded view of the device of
figure 1;
figure 4 shows a detail in sectional view that shows
the members of the ball-and-socket articulated joint;
figure 5 shows the members of figure 4 with the support
of the mast foot shown inclined;
figure 6 shows a slide seat for the device according
to the invention;
figure 7 is a top view of the device of figure 6;
figure 8 is a section taken on the plane VIII-VIII of
figure 6;
figure 9 shows the base of the device of figure 1,
applicable to the seat of figure 6; shown in partial
section;
figure 10 shows a sectional view according to plane X-X
of figure 9, and
figure 11 shows a sailing board provided with a device
according to the present invention.

Detailed description of the invention

By referring at first to figure 1, the device according
to the present invention is shown mounted on a sailing
board 1 (drafted in dotted lines) provided with a hole
2 for the mounting of the device. The device includes
a base 3 that constitutes a first member of an articu-
lated joint, which is integral with a spine 4 for the
insertion into the mounting hole 2. The device includes
also a support 5 that constitutes a second member of
an articulated joint, said support 5 being arranged
for supporting a mast foot 6 on which the hollow mast
7 of the sailing board is mounted (shown with dotted
lines). A lid 8 screwed on the support 5, as it will
be disclosed hereinafter, closes on the top the device

and keeps locked in position the mast foot 6 on the support 5.

The mast foot 6 is freely rotatable around a vertical axis with respect to the support 5 and moreover it follows the support 5 in any displacement of the same from the vertical attitude, in which the support 5 is aligned with the base 3.

The support 5 and the base 3 are coupled together by means of an articulated joint, that will be disclosed into detail hereinafter, that allows a displacement of the base 3, and consequently of the mast 7, with respect to the vertical attitude, as it is shown as an illustration in figure 2.

As a matter of fact it is necessary that in the "wind surf" practice the mast might assume a whatsoever position with respect to the sailing board, there being included the absolutely vertical position and the practically horizontal position with the mast floating on water.

With reference to figure 3, now we will disclose the members that constitute the device, in exploded view, wherefrom the mounting spine 4 has been omitted for sake of clarity.

The base 3 comprises a strong body having a housing 9 and a through hole 10 at the top, the base 3 has a head 11 shaped as a sector of a sphere, having in the lower part a throat 12. The head 11 is traversed by the hole 10 that at the top, preferably is provided with a flaring. The support 5 for the mast foot 6 is comprised of a tubular body that preferably in the lower part of its wall has an increased diameter, so that a step or abutment is formed where the mast foot 6 will rest. The diameter of the lower part of the support 5 is such so that it

may be coupled in a sufficiently tight fit, though with an appreciable clearance, because a tight precision is not necessary, around the head 11, as it is shown in enlarged scale in figure 4.

5 A plug 14, traversed with a hole 14a is screwed in the lower part in the restricted diameter portion of the support 5, as it is best seen in figure 4. The plug 14 serves as a bottom rest for the compression spring 15, that is arranged within the tubular housing of the
10 support 5.

A traction stress resistant flexible member, preferably a steel rope shown in 16, is arranged in the hole 10 of the base 3, in the hole 14a of the plug 14 and at the interior of the support 5 and spring 15. The rope
15 16 is provided at its lower end with a stop 17 located in the housing 9 of the base 3, that prevents an upwards motion of the rope itself. At the top end, the rope 16 is integrally provided with a threaded rod 18 whereon a nut 19 is screwed that constitutes the top rest
20 bearing for the spring 15, preferably through a washer 20 (as it is better seen in figure 4).

In figure 3 there is also shown the mast foot 6, that constitutes the member whereon the actual mast 7 of the sailing board is mounted and fastened. The mast
25 ~~foot 6 rests with its lower edge 21 onto the step 13 of the support 5, preferably through an antifriction member 22, so that it can rotate freely with respect to the same support 5.~~

In figure 3, there is shown also the lid or cover 8
30 that is screwed on a threading 23 on the top external surface of the support 5, so that the lower edge 24 of the cover 8 may rest against the upper edge of the mast foot 6, so as to prevent this latter to get out

from the support 5.

With reference to figures 4 and 5 the operation of the device will be described.

5 The device is mounted by inserting the rope 16 into the hole 10 of the base 3 and into the hole 14a of the plug 14. With the rope 16 still loose, the plug 14 is screwed in the support 5 and the support 5 is then laid down with its lower edge 26 onto a surface 27 supporting the base 3, around the head 11. Then the spring 15
10 is inserted by placing it on the plug 14 and on the threaded rod 18 that protrudes outside of the support 5, the washer 20 is inserted and the nut 19 is screwed, so that the looseness of the rope 16 is completely taken out, up to when the stop 17 contacts the base 3
15 and, possibly, the nut 19 may be further tightened in order to compress the spring 15 and to put under a certain preliminar tension stress the rope 16.

In this way the whole is kept constrained and in the absence of other stresses, the attitude of the support
20 5 remains vertical and aligned with the base 3.

When the mast with the sail is mounted on the mast foot (not shown) the force of the wind on the center of force of the sail will transmit to the support 5 a
25 force tending/put out of alignment the same support 5 with respect to the base 3 and to place it in an attitude different from the vertical one. In the conventional "windsurf" systems such a force is opposed by the windsurfer who with his own weight and the force of the arms adjusts the attitude condition of the mast in the
30 most suitable way.

In the device according to the present invention (see in particular figure 5) a displacement of the mast with respect to its vertical attitude will cause, owing to

the increase of the distance between the plug 14 and the head 11, while the length of the rope between the stop 17 and the nut 19 remains unchanged, a return of the nut 19 and of the washer 20 towards the interior of the support 5. This, on its turn will cause the compression of the spring 15 between the washer 20 and the plug 14 and the creation of an elastic force that opposes the maintainment of the mast in a position different from the vertical one.

10 This restoring or return elastic force may be suitably trimmed either by means of the design of the spring, or by means of a more or less deep screwing down of the nut 19 on the rod 18. The aim of the present invention is not that of having the mast to come back to the vertical position under the restoring action of the

15 spring, even if this is possible from the theoretical standpoint, but to add to the force developed by the arms and the weight of the windsurfer for balancing the push of the wind, the force derived from the compression of the spring 15.

20 In this way, indeed, the restoring force of the spring causes an help to the windsurfer in the effort of preventing that the mast falls down completely and consequently reduces the physical effort of the windsurfer.

25 Moreover since for the majority of the maneuvers with the sailing board the attitude of the mast will not be far away from the vertical one, the action performed by the spring will constitute simply an help to the windsurfer.

30 However, as it happens frequently, particularly with beginners and the less experienced windsurfers, the mast falls down completely in water becoming practically horizontal, the spring 15 in such a case will be

compressed at its maximum and it will provide then the maximum contribution to the effort for re-erecting the sail, and precisely, in a circumstance in which the effort requested to the windsurfer is a maximum one.

5 If the restoring force produced by the spring 15 is trimmed so that it is just a bit lower than the weight of the mast and of the sail, in order to re-erect the mast it will be necessary just a small pull effort by the windsurfer on the line provided for this purpose,
10 so that the mast together with the sail deprived of wind re-erects almost without human intervention. It is obvious however that the windsurfer himself may adjust the help provided by the spring, by screwing more or less in depth the nut 19.

15 As it can be seen in figure 5, in the inclined position of the support 5, the lower edge 26 of the same remains resting on the abutment surface 27 of the base 3 remaining engaged with the throat 12 of the head 11. In this attitude, there is formed an instantaneous point of
20 rotation constituted by the contact between the edge 26 and the abutment surface 27, this point being offset with respect to the upper end of the hole 10 of the base, for which the pull force exerted by the rope 16 creates the necessary torque for restoring the support
25 5 in its vertical attitude.

In the vertical attitude, or for very limited displacements from the vertical attitude, the internal surface of the support 5 is maintained in contact with the head 11, preferably shaped as a sector of a sphere, thus
30 realizing a ball-and-socket joint effect almost perfect. The device according to the present invention may be made of a plastic material, preferably one having the properties of nylon.

As it has been said hereinbefore, the device according to the present invention may be mounted on the sailing board by inserting a conventional spine integral with the base 3, in the mounting hole of the sailing board.

5 However the device according to the invention may also be mounted on conventional sailing boards provided with a pair of mounting holes, by means of a seat that allows the positioning of the device itself in a whatsoever point within the seat itself, and this constitutes a further feature of the present invention.

10 With reference to the figures 6 to 11, the seat 31, realized in plastic material, preferably one having the properties of nylon, is provided on the upper end with a metal guideway 32 fastened to the seat 31, as example

15 by means of screws 33.

The guideway 32 has a channel general shape (see figure 8) and shows slots 34 corresponding to similar slots obtained in the body of the seat 31 (not shown) through which screws 35 are set engaged with conical expansion

20 members 36 that are placed at the interior of spines 37 that can be inserted into the two mounting holes provided for in the sailing board.

The slots allow to compensate the different distances of the holes according to the particular sailing board on which the seat 31 should be mounted, and tightening

25 the screws 35 that have a head that remains sunk and at level with the surface of the guideway 32, the expansion members 36 are drawn out and push the wall of the spines 37 against the wall of the mounting hole,

30 locking thus in position the seat 31 on the sailing board.

The guideway 32 is moreover provided with a series of pairs of locating holes 38. These holes 38 serve to

lock in position a slider 39 (figures 9 and 10), that is inserted in the rear part of the guideway 32 and that has a shape complementary with that of the guideway 32, so that it may be kept into it and it may run along the same.

The slider carries integral therewith, a base member 40 that corresponds to the base 3 shown in the foregoing disclosure, that is part of the device according to the present invention.

On the rear part of the slider (with the term -rear- we mean the said towards stern of the sailing board) there is arranged a pedal device that allows to shift the slider 39 with the foot along the slide 32. The pedal system includes a pedal lever 41 hinged in 42 to the slider 39, that engages a spine member 43 shaped as a stirrup, having two projections directed downward, spire shaped, that engage with the locating holes 38. A spring 44 maintains the pedal lever 41 in the position of engagement of the spines 43 with the holes 38, so that normally the slider is locked in a position at the interior of the guideway 32, corresponding to the engagement of the spines 43 with a pair of holes 38. On the rear part of the seat 31, there may be provided a wing 45 that in the closed condition prevents the exit of the slider 39 from the guideway 32 and that may be readily open for the locking and unlocking of the same slider 39.

With this seat for the device according to the present invention, it is easy for the windsurfer who wants to change the position of the mast on the sailing board, to shiver the sail maintaining with his arms the mast in the vertical position, and operate with the foot the lever 41 up to when the desired position is reached.

With the seat of the present invention it is avoided to have to use the hands for an operation of this kind, as it is necessary with the arrangements according to the prior art, and moreover, since the seat 31 is appli-
5 cable to any kind of sailing board having two holes for the mounting of the mast, it allows to add a further maneuver possibility to sailing boards that otherwise would be deprived thereof.

In figure 11 there is shown a sailing board with the de-
10 vice according to the present invention indicated in 6, applied on a seat 31.

Notwithstanding the fact that in the shown embodiments the ball-and-socket joint between the base and the support of the mast foot has been represented with the
15 head integral with the base, it is obvious that this arrangement could be inverted, realizing the spherical head integral with the support of the mast foot and realizing the base as a cup.

It is also obvious that the invention may be realized
20 through equivalent modifications of the embodiments disclosed into detail in the present disclosure, and that such modifications fall within the scope of the present invention.

CLAIMS

1. A device for the erection of the mast of a sailing board, comprising: a base fastened to said board carrying a first articulated joint member of the ball-joint-type; a mast foot support carrying a second articulated joint member of the ball-joint-type, engaged with said first member of the base for constituting an articulated joint of the ball-and-socket type; an elastic tie-member unit, including a flexible member resistant to tensile stress, restrained to said base, and a compression spring restrained between said support and said flexible member, said base and said support being kept together by said flexible member and being normally axially in register, so that a bending of said flexible member caused by a rotation in a vertical plane of the support with respect to the base, causes a strain upon said spring that produces a force tending to restore said support in alignment with said base; and a mast foot coaxial and freely rotatable around said support.
2. A device according to claim 1, in which said articulated joints of the ball-joint-type include: a head having a spherical sector general shape showing, at its base, a throat radiused with a support surface; and a tubular member arranged around said head, a point on the edge of said tubular member when abutting on said rest surface, constituting the instantaneous rotation center of the ball-joint.
3. A device according to claim 2 comprising: a base fastened at its lower end to the sailing board having an internal cavity and provided at the top end with said spherical sector head and having a through hole communicating with said cavity; a mast foot support

- having a hollow tubular wall with a lower inner diameter such as to mate around said head of said base, said wall being provided on its exterior with an external rest for a mast foot and at its interior with an internal rest for said compression spring, said internal rest having a longitudinal through hole; a flexible rope passing through the hole of said base and the hole of said internal rest, said rope being provided at its lower end with a stop that prevents its escape from the hole of said base and being provided at its top end with an abutment for the engagement with said spring; and a helical compression spring abutting at its lower end to said internal rest of said support and at its top end to said abutment of said rope.
- 5
- 10
- 15 4. A device according to claim 3, wherein said internal rest of said support is a threaded plug screwed on the interior of said wall and provided with a through hole.
- 20 5. A device according to claim 4, wherein said tubular support has a lower section of enlarged diameter, so as to form on its wall a step that constitutes said external rest and said plug is threadly engaged with the lower inner part of said wall having a reduced diameter.
- 25 6. A device according to claim 3, wherein said external rest of the support for the mast foot is provided with an antifriction element for rendering easier the free rotation of the mast foot around said support.
- 30 7. A device according to claim 3, wherein the abutment on said rope for the rest of the spring comprises a threaded rod integral with the rope, whereon a nut is screw-engaged, so that the position of the nut on said rod determines the rest point of the spring along said

rope.

5 8. A device according to claim 3, wherein a lid for the hermetical closure of the cavity of said support and for locking the mast foot on said support, is screwed on the top end of said support.

10 9. A device according to claim 3, wherein said base comprises: a positioning seat provided with two pins for its fastening to the two insertion holes present in the sailing board, said seat having a guide with a series of locating holes, a slider slidably engageable with said guide, said first articulation member of the ball-joint-type being integral with said slider, locking pins engageable with said holes of the seat, carried by said slider; a pedal hinged to said slider that
15 controls the engagement and the disengagement of said locking pins with the holes of the seat, elastically maintained in the engagement position, whereby said slider may be positioned at will within said seat for establishing the position of the mast of the sailing
20 board.

10. A device according to claim 9, wherein said seat comprises a wing hinged thereto that allows to open an end of said guide for permitting the introduction or the extraction of said slider and to close it for preventing its exit.
25

11. A device according to claim 9 wherein said pins are adjustable through slots provided in said seat and in said guide.

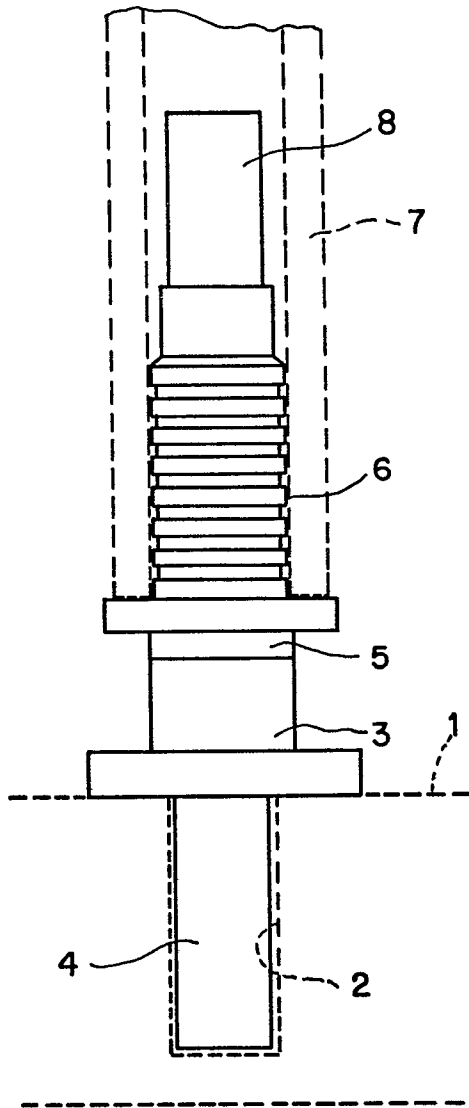
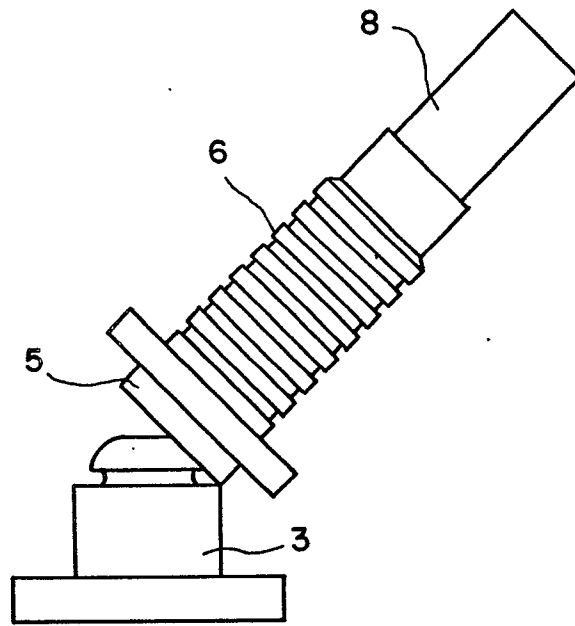
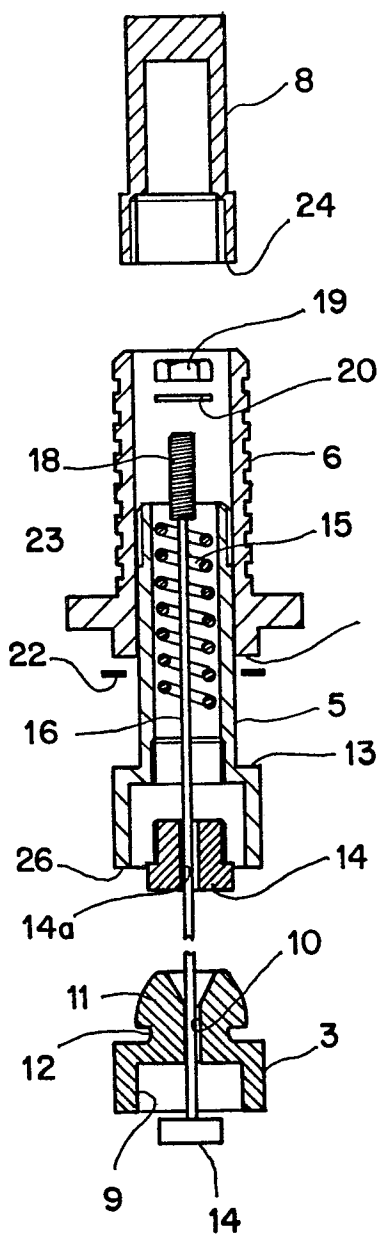
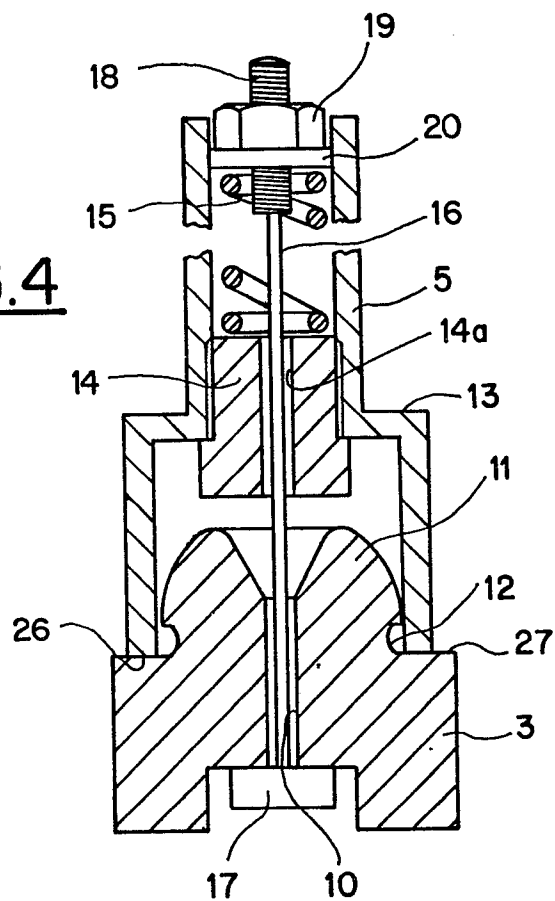
FIG.1FIG.2

FIG.3FIG.4FIG.5